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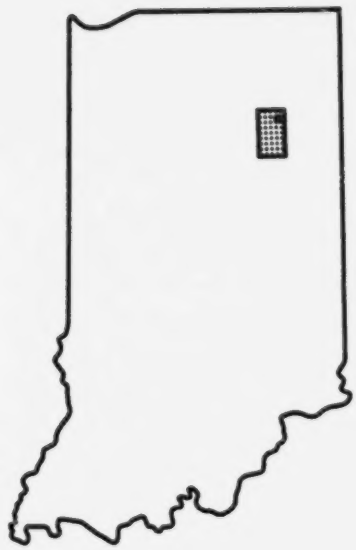
# FLOOD INSURANCE STUDY

ORIGINAL
COMPLETED
32

## TOWN OF ROANOKE, INDIANA
### HUNTINGTON COUNTY



**JUNE 1, 1982**

Federal Emergency Management Agency

**COMMUNITY NUMBER - 180096**

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

TOWN OF ROANOKE

HUNTINGTON COUNTY, INDIANA

## 1.0 INTRODUCTION

### 1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Roanoke, Huntington County, Indiana, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Roanoke to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3(d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

### 1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Gannett, Fleming, Corddry, and Carpenter, Inc., of Harrisburg, Pennsylvania, for FEMA, under Contract No. H-4804. This study was completed in June 1981. All field surveys and aerial mapping were performed by Abrams Aerial Survey Corporation of Lansing, Michigan.

### 1.3 Coordination

Upon the initiation of the study, a legal notice was placed in the Four Corners Courier on September 5, 1979, to notify all interested persons to submit any relevant facts and technical data concerning local flood hazards. Streams requiring detailed study were identified at a meeting attended by representatives of the study contractor, the FEMA, the Indiana Department of Natural Resources (IDNR) and representatives of the Town of Roanoke in May 1978. Results of the hydrologic and hydraulic analyses were coordinated and close contact was maintained with IDNR during the course of the

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study. The U.S. Geological Survey (USGS) office in Indianapolis was contacted and provided recorded flood data and other relevant information. The U.S. Department of Agriculture, Soil Conservation was contacted and provided information used in the Hydrologic Analysis.

On January 5, 1982, the results of the study were reviewed at the final meeting attended by representatives of the Study Contractor, FEMA, IDNR, and community officials. The study was acceptable to the community.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Roanoke, Huntington County, Indiana. The area of study is shown on the Vicinity Map (Figure 1).

The limts of detailed study in Roanoke was determined by FEMA with community, Study Contractor and IDNR consultation at the meeting in May 1978.

Flooding caused by overflow of Cow Creek and McPherren Ditch within the corporate limits was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through June 1986.

### 2.2 Community Description

The Town of Roanoke is located in the northeastern portion of Indiana in the northeastern corner of Huntington County. The total land area contained within the Roanoke corporate limits is approximately 13.5 acres. The town, which is completely surrounded by Unincorporated Areas of Huntington County, is situated 9 miles northeast of Huntington and 15 miles southwest of the center of Fort Wayne, Indiana. According to U.S. Census Bureau figures, the population has decreased 8.1% from 935 in 1960 to 858 in 1970 (Reference 1).

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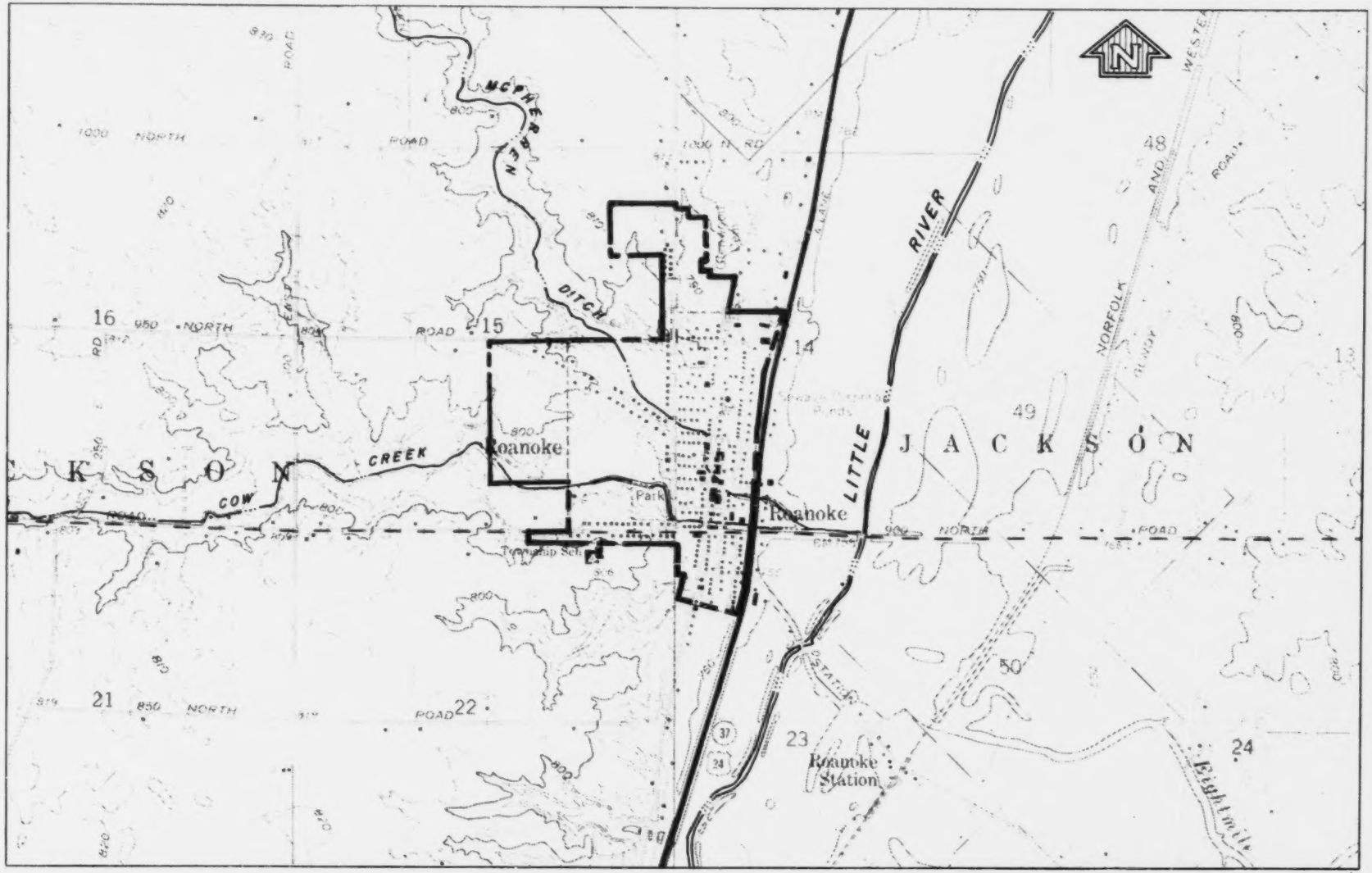


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

## TOWN OF ROANOKE, IN
(HUNTINGTON CO.)

APPROXIMATE SCALE

2,000' 0 2,000' 4,000' 6,000'

## VICINITY MAP

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The Town of Roanoke is located in the Little River watershed being part of the Upper Wabash River Basin of northeastern Indiana. The Upper Wabash River Basin is one of the 18 watersheds established in 1956 by the Indiana Water Resources Study Committee and it includes roughly 3,779 square miles, primarily in northeastern Indiana and 285 square miles in northwestern Ohio. The land surface of the Little River watershed is a result of glaciation of the Wisconsin Age and consists of ground moraine and end moraines. The surface of the Town of Roanoke is primarily ground moraine consisting of glacial till. The valley terrain of the immediate study area adjacent to Cow Creek and Mcpherren Ditch is composed of outwash sediments consisting of sand, gravel, clay and mixtures of each.

The Little River watershed, which contributes to Upper Wabash River Basin, is of oblong shape with its axis running north-northeast to south-southwest. The watershed is bounded on the northwest by the Salamonie Moraine and to the southeast by the Wabash Moraine. The Upper Wabash River Basin, including the Little River watershed and the town of Roanoke, is in the physiographic region known as the Tipton Till plain. This region includes most of the central part of the State of Indiana, extending from Ohio to Illinois and roughly bounded north and south by 41° to 39.5° latitude (Reference 2). The cumulative thickness of unconsolidated sand and gravel above bedrock at the town of Roanoke varies from 0 to 20 feet. The bedrock which underlies the area consists primarily of limestone and dolomite of the Silurian Age, at a basement elevation varying from 720 to 740 NGVD (Reference 3).

Cow Creek, which flows east through the southern end of town, originates northwest of the Town of Roanoke and flows 5.5 miles south and east to its confluence with the Little River immediately upstream of the 900 North Road bridge over the Little River. Cow Creek falls 105 feet in this length and has a drainage area at its mouth of 8.51 square miles. McPherren Ditch, a tributary to Cow Creek, originates northwest of town and flows diagonally through the center of Roanoke from northwest to southeast. Through its length of 2.9 miles it falls 80 feet and drains 1.4 square miles at its mouth, approximately 1,000 feet east of Roanoke's eastern corporate limit (Reference 4).

The topography of the area is nearly flat to gently rolling, and has gentle land slopes except near the Little River, where entrenchment of the river valley has occurred. The Town of Roanoke is situated adjacent to the edge of the Little River flood plain and has a range in local elevation from about 750 feet NGVD near the eastern corporate limits to over 800 feet NGVD on the western and northern corporate limits of town. The flood plain of the Little River adjacent to Roanoke is divided from Roanoke by U.S. Route 24, however, the water surface elevations at the downstream end of Cow Creek and McPherren Ditch are affected by backwater from the Little River.

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Approximately 60 percent of the land within the corporate limits of the Town of Roanoke has been developed, with the remainder of the land being vacant or wooded. The development which has occurred is distributed uniformly throughout the eastern half of the corporate limits. Within the flood plains studied, development consists of residential and commercial establishments. The downstream reach of Cow Creek is through primarily residential areas with the area immediately upstream of Seminary Street being used for a park and playground. The area west of the park is currently undeveloped. McPherren Ditch runs through fully developed residential and commercial areas east of Seminary Street. The stream has a concrete channel from just above Third Street downstream to the entrance of a long culvert which conveys the stream under Main Street to south of Second Street. Upstream of Seminary Street the flood plains of McPherren Ditch are not developed. U.S. Route 24 and the Norfolk and Western Railway are the primary transportation arteries serving the residents of the town of Roanoke.

The climate of this region is characterized by moderately warm summers with temperatures occasionally rising above 85 degrees, and cool winters with temperatures dropping below 20 degrees. The annual precipitation over the watershed averages 39 inches including runoff from 20 inches of snow fall. A major portion of the total precipitation occurs in the spring and summer of the year (Reference 5).

## 2.3 Principal Flood Problems

The past history of flooding within the Town of Roanoke indicates that flooding may occur during any seasons of the year, but the majority of major floods have occurred in the spring, resulting from heavy rains sometimes combined with snowmelt and ice jams. A review of the records of the stream flow gages maintained by the U.S. Geological Survey in the Upper Wabash River Basin indicates that major floods have been experienced in the vicinity of the Town of Roanoke on March 1913, March 1927, January 1930, May 1933, May 1943, January 1950, June 1957, June 1958, February 1959, and April 1964 (Reference 6). The worst flood to be recorded occurred on March 26, 1913, and this storm event caused record floods throughout the Midwest. The storm which produced the flood was of long duration and spread from New York to Mississippi with its center around Richmond, Indiana and Bellefontaine, Ohio.

The records of the USGS gaging station on the Little River about 4.5 miles downstream from the Town of Roanoke extend back to 1944. This information shows the three highest peak discharges to be recorded January 1, 1950, February 11, 1959 and March 4, 1955, respectively. The highest recorded stage since 1944 was the 1959 flood, with the second highest occurring on December 9, 1966. Ice jams are a problem on the Little River, causing much higher flood levels than would normally be produced by the amount of runoff for a given storm.

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Discussions with local residents and articles from old area newspapers indicate that flooding in the Town of Roanoke occurred on March 14, 1925 and, to a lesser extent, in January 1950. One area resident claimed that in 1937 floodwaters were "knee-deep" on Main Street and that water reached almost exactly the level of the first flood of the furniture store at Second and Main Streets. The possibility of clogged culverts aggravating the situation was suggested but nothing more has substantiated this possibility. The newspaper articles below record past floods in the Town of Roanoke.

THE HUNTINGTON HERALD - PRESS

March 25, 1925

*STREAM ON A RAMPAGE*

*LITTLE RIVER COMES WITHIN FOOT OF THE 1913 FLOOD MARK*

*OTHER STREAMS HIGH*

*Light Plant Depending Entirely On High Power Lines - Roanoke Experiences Real Flood At Night*

*Following a continuous rainfall of eighteen hours. Little River and its tributaries went on a ramage (sic) Saturday as the flood waters overflowed the river's banks and inundated the lowlands .....*

*Roanoke suffered heavily from the flood damage. The creek there overflowed its banks and coursed through the streets of the town, filling basements and causing havoc in general. The entire basement of the Ford garage there was flooded but the water subsided Saturday sufficiently to allow men to get in and clean up the refuse left by the water.*

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THE HUNTINGTON HERALD - PRESS

March 25, 1925 (cont'd.)

*State Road No. 7 between Huntington and Roanoke was covered with water about a mile west of Roanoke. Several cars went off the road in trying to drive through the water. One Chevrolet was covered with water up to the seats where it went off the road. Travelers said they noticed five cars in the water at the side of the road there Friday night but all but one had been removed by Saturday morning. The water had subsided Saturday morning sufficiently that motorists could get through.*

HUNTINGTON HERALD - PRESS

January 4, 1950

*RAINS SWELL COUNTY STREAMS*

*Wabash, Salamonie and Little Rivers on Rampage; Many Small Road Washouts*

---

*Huntington County was under water to the north, south, east and west Wednesday as the Salamonie, Wabash and Little Rivers, numerous creeks, streams and drainage ditches fed by a 60-hour rain, went on a rampage.*

*Andrews, Warren, Markle, Roanoke and Mt. Etna reported high water, but there appeared to be no serious flood threat at any of those towns. Glenn Shaw, operator of the old Bellville Mill, long a Huntington County landmark, reported Wednesday that the water is at its highest level there in the last four years and still going up.*

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No damage estimates or highwater marks from past floods in the Town of Roanoke were available, with the exception of the gen ral descriptions of past flooding conditions from the local residents. The estimated 100-year and 500-year flood levels are presented in Figure 2, 3, 4 and 5.

### 2.4 Flood Protection Measures

There are no known structural flood protection levees or dams in the Town of Roanoke. The channel for Cow Creek has been straightened east of Seminary Street and other channel improvements have been made subsequent to the 1937 flood. According to residents, the McPherren Ditch has been cleaned out several times. At the Fourth Street bridge, the banks have been formed by concrete block. The channel downstream of Third Street has been improved and the corrugated metal culvert has been added under Main and Second Streets.

Beyond these, non-structural measures of flood protection are being utilized to aid in the prevention of future flood damage. These are in the form of land use regulations adopted from the code of Federal Regulations which controls building within areas that have a high risk of flooding (Reference 7).

## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10, 50, 100, and 500 year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

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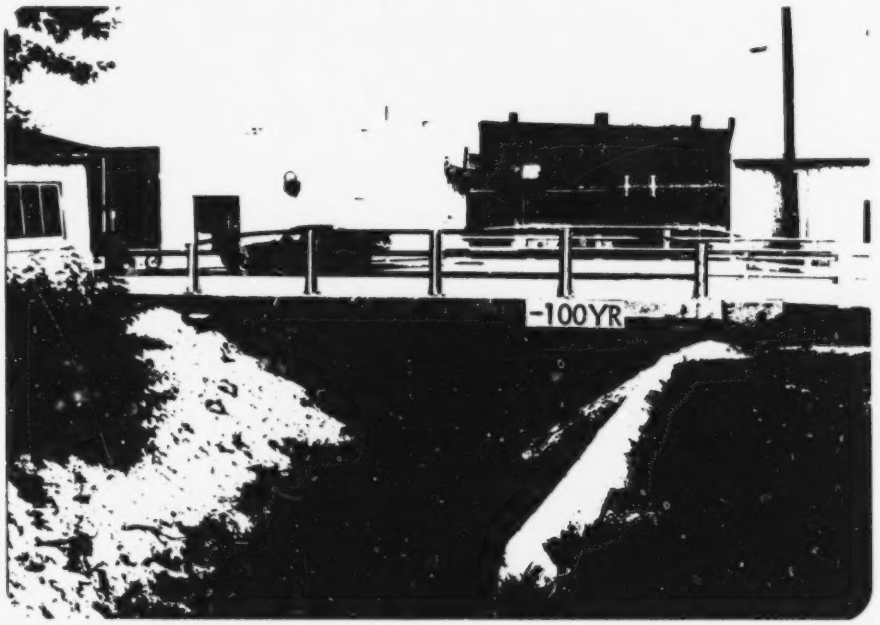


Figure 2. View looking south at the upstream face of the Third Street bridge over McPherren Ditch in the Town of Roanoke. The estimated 100-year flood level is indicated, the 500-year flow is 0.4 feet higher at this site. (Photo date June 1979)

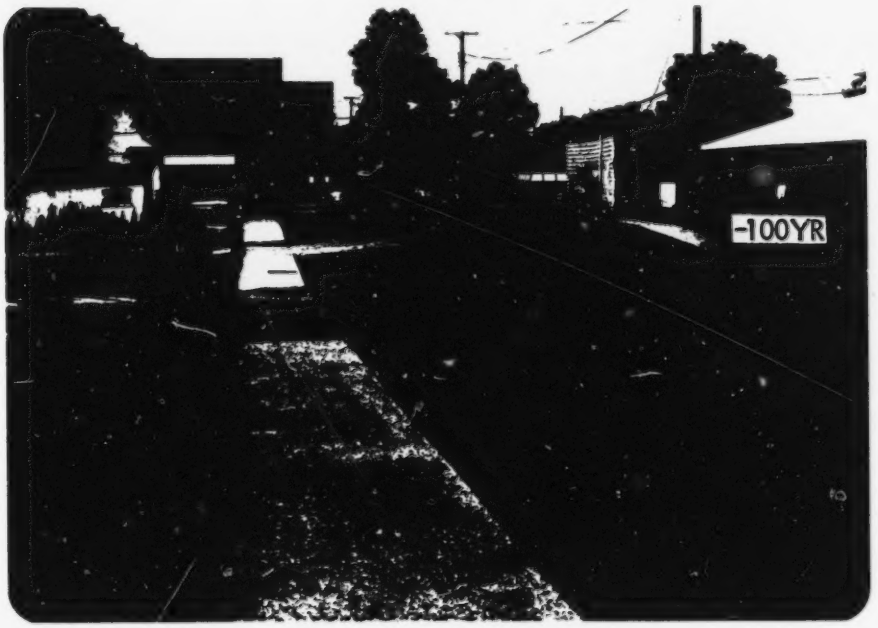


Figure 3. View looking east across the Third Street bridge over McPherren Ditch in the Town of Roanoke. The estimated 100-year flood level is indicated. The 500-year level is 0.4 feet higher at this site. (Photo date June 1979)

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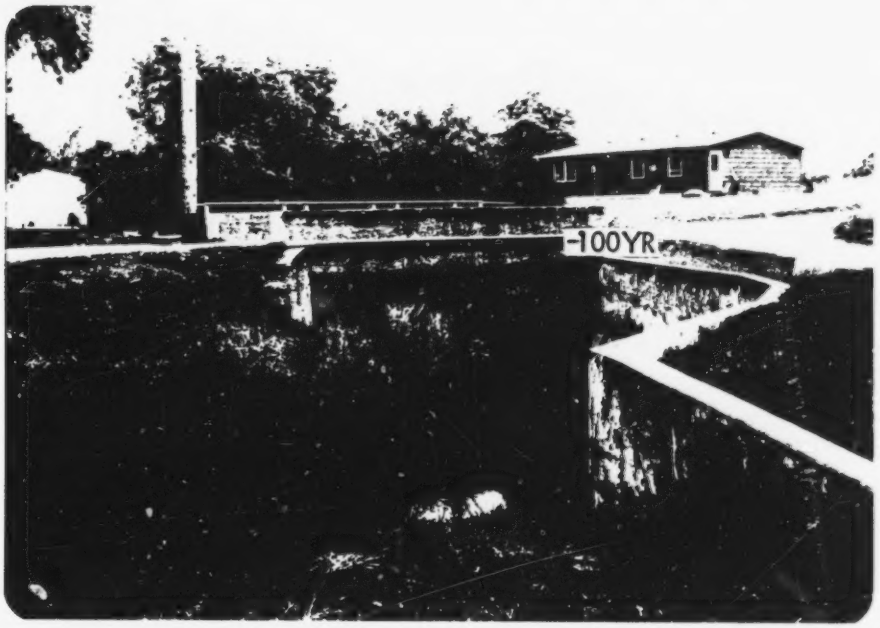


Figure 4. View looking east at the upstream face of the Seminary Street bridge over Cow Creek in the Town of Roanoke. The estimated 100-year flood level is indicated. The 500-year flood level is 0.5 feet higher at this site. (Photo date June 1979)

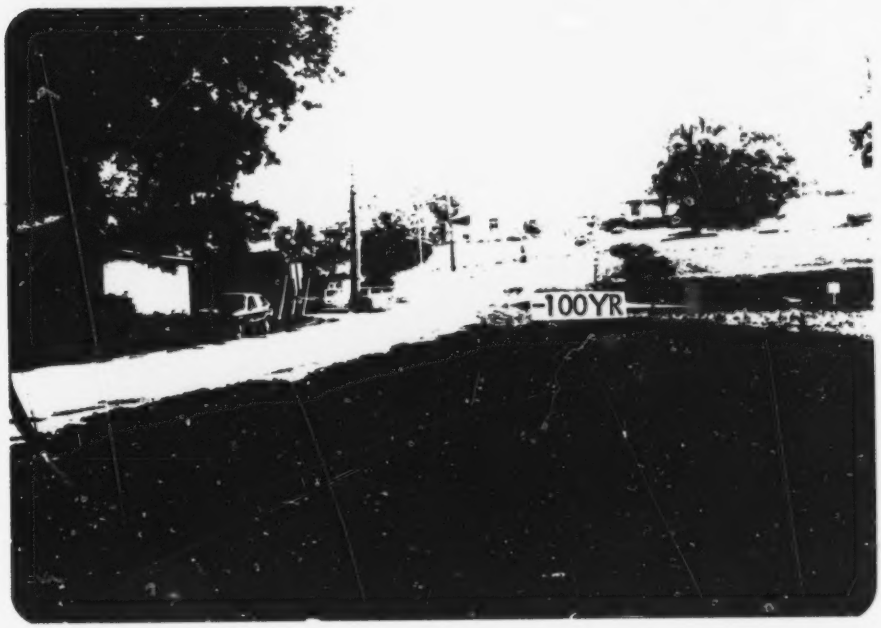


Figure 5. View looking south across the Seminary Street bridge over Cow Creek in the Town of Roanoke. The estimated 100-year flood level is indicated and the 500-year level is 0.5 feet higher at this site. (Photo date June 1979)

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### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

By a Memorandum of Understanding of May 6, 1976, the U.S. Soil Conservation Service, The U.S. Geological Survey, the Corps of Engineers, and the Indiana Department of Natural Resources mutually agreed to coordinate discharge-frequency values for use in water resources investigation and planning activities in the State of Indiana. The Indiana Department of Natural Resources is the State Coordinating Agency for all of the Flood Insurance Studies which are performed in the State of Indiana and they have compiled and published the coordinated discharges of selected streams in Indiana.

The discharge-frequency curves for the Cow Creek and McPherren Ditch which have been used in this Study were obtained from this publication (Reference 8) by request of the FEMA and the IDNR.

A summary of drainage area-peak discharge relationships for each of the detail study streams is shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-YEAR | 50-YEAR | 100-YEAR | 500-YEAR |
|---|---|---|---|---|---|
| COW CREEK | | | | | |
| At confluence with the Little River | 8.5 | 800 | 1,270 | 1,440 | 1,780 |
| MCPHERREN DITCH | | | | | |
| At confluence with Cow Creek | 1.4 | 260 | 400 | 460 | 600 |

### 3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the Town of Roanoke were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along Cow Creek and McPherren Ditch.

Cross sections for the backwater analyses of Cow Creek and McPherren Ditch were obtained from aerial photographs flown in April 1979, at a negative scale of 1:12,000 (Reference 9). The below-water sections

were obtained by field measurements. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Channel roughness factors (Mannings's "n") used in the hydraulic computations were based on field observations of the streams and flood plain areas using the procedures outlined in the Soil Conservation Service National Engineering Handbook (Reference 10). Roughness values for the channel of the Cow Creek range from 0.032 to 0.045 with flood plain roughness values ranging from 0.035 to 0.060 for all floods. Roughness values for the channel of McPherren Ditch range from 0.030 to 0.045 with overbank values ranging from 0.045 to 0.065.

Water surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 step-backwater computer program (Reference 11). Flood profiles were drawn to an accuracy of +0.5 foot showing computed water surface elevations for floods of the selected recurrence intervals. Starting water surface elevations for each detail study stream were calculated assuming normal depth of flow. Near the downstream ends of Cow Creek and McPherren Ditch, flood elevations from the Little River control were plotted on the profiles (Reference 12). All elevations are referenced from the National Geodetic Vertical Datum of 1929, (NGVD) formerly referred to as Sea Level Datum of 1929; elevation reference marks used in this study are shown on the maps. The approximate study for Cow Creek was completed by assuming similar flow characteristics in the approximate study reach as was determined for the detail study reach.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

## 4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

### 4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the



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boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using photogrammetric equipment, aerial photographs (Reference 9) and topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 13). Areas of approximate study were delineated on existing topographic maps (Reference 13). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown. Certain areas shown on the Flood Hazard Boundary Map (Reference 14) were determined to be areas of minimal flooding and, as such, have not been shown on The Flood Boundary Floodway Map or The Flood Insurance Rate Map.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

## 4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The State of Indiana, however, as set down by the Indiana Flood Control Act of 1945 and the Natural Resources Commission Policy Guidelines, Section 6, adopted March 28, 1974 (Reference 15), has designated that encroachment in the flood plain is limited to that which will cause no significant increase in flood heights. As a result, no more than 0.1 foot surcharge has been delineated for this study. The floodways recommended in this report were approved by the Indiana State Natural Resources Commission when the review process was completed and are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

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As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 6.

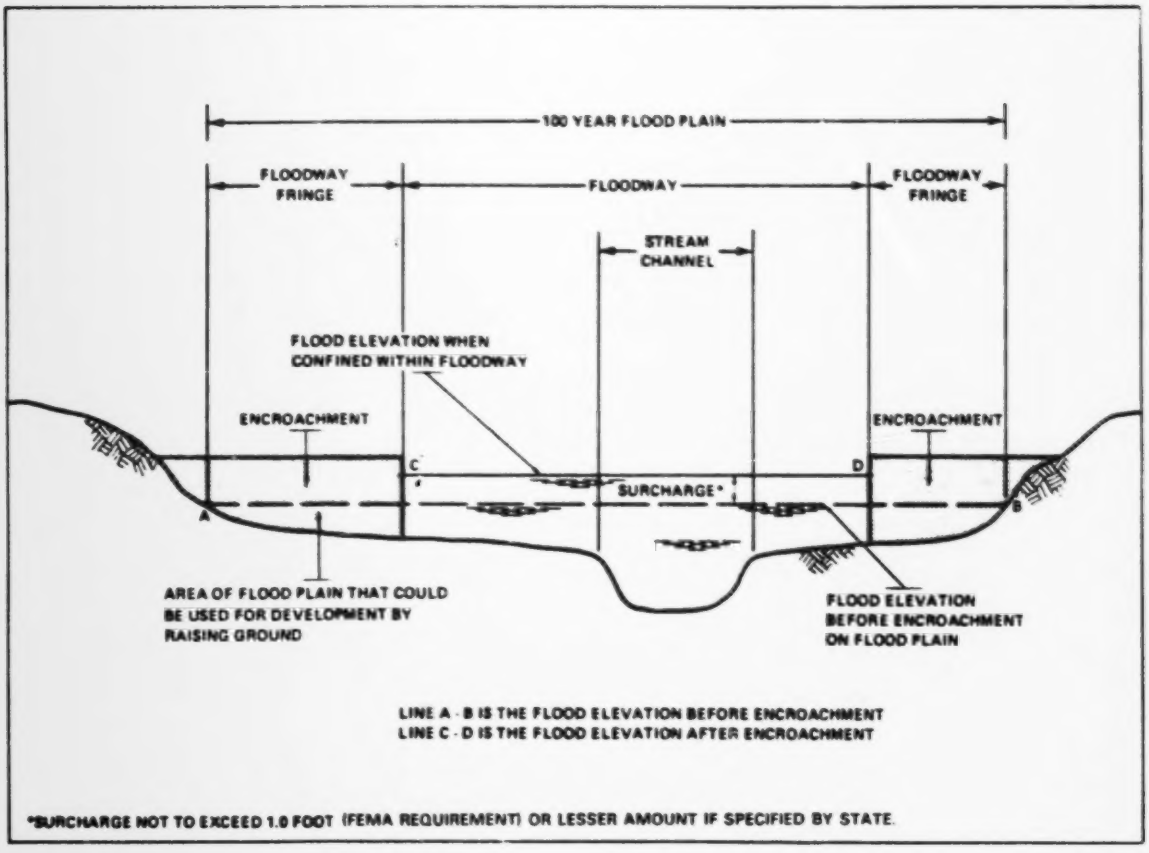
100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 6

FLOODWAY SCHEMATIC

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| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQ. FT.) | MEAN VELOCITY (FEET/SEC.) | REGULATORY (NGVD) | WITHOUT FLOODWAY (NGVD) | WITH FLOODWAY (NGVD) | INCREASE (FEET) |
| Cow Creek | | | | | | | | |
| A | 200 | 100 | 394 | 3.7 | 752.8 | 752.8[2] | 752.8 | 0.0 |
| B | 495 | 32 | 191 | 7.5 | 753.3 | 753.3[2] | 753.3 | 0.0 |
| C | 705 | 41 | 220 | 6.5 | 754.2 | 754.2 | 754.2 | 0.0 |
| D | 1,040 | 62 | 292 | 4.9 | 755.5 | 755.5 | 755.5 | 0.0 |
| E | 1,200 | 142 | 553 | 2.6 | 756.5 | 756.5 | 756.6 | 0.1 |
| F | 1,415 | 258 | 840 | 1.7 | 756.6 | 756.6 | 756.7 | 0.1 |
| G | 1,870 | 170 | 357 | 4.0 | 756.9 | 756.9 | 756.9 | 0.0 |
| H | 2,215 | 70 | 295 | 4.9 | 757.4 | 757.4 | 757.5 | 0.1 |
| I | 2,880 | 55 | 242 | 6.0 | 759.1 | 759.1 | 759.1 | 0.0 |

[1]Feet above corporate limits.
[2]Elevations without considering backwater effect from Little River.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ROANOKE, IN
(HUNTINGTON CO.)

FLOODWAY DATA

COW CREEK

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| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQ. FT.) | MEAN VELOCITY (FEET/SEC.) | REGULATORY (NGVD) | WITHOUT FLOODWAY (NGVD) | WITH FLOODWAY (NGVD) | INCREASE (FEET) |
| McPherren Ditch | | | | | | | | |
| A | 180 | 19 | 50 | 9.3 | 752.6 | 751.0[2] | 751.0 | 0.0 |
| B | 300 | 19 | 80 | 5.7 | 753.1 | 753.0[2] | 753.1 | 0.1 |
| C | 600 | 65 | 95 | 4.8 | 755.2 | 755.2 | 755.3 | 0.1 |
| D | 790 | 51 | 161 | 2.9 | 756.4 | 756.4 | 756.5 | 0.1 |
| E | 1,045 | 64 | 173 | 2.7 | 756.9 | 756.9 | 757.0 | 0.1 |
| F | 1,320 | 100 | 215 | 2.1 | 757.9 | 757.9 | 758.0 | 0.1 |
| G | 1,720 | 27 | 77 | 6.0 | 758.6 | 758.6 | 758.7 | 0.1 |
| H | 1,910 | 101 | 254 | 1.8 | 760.4 | 760.4 | 760.4 | 0.0 |
| I | 2,460 | 34 | 83 | 5.5 | 761.1 | 761.1 | 761.2 | 0.1 |
| J | 3,265 | 69/0[3] | 132 | 3.5 | 766.0 | 766.0 | 766.0 | 0.0 |

[1] Feet above corporate limits.
[2] Elevations without considering backwater effect from Little River.
[3] Total width/width within corporate limits.

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ROANOKE, IN
(HUNTINGTON CO.)

FLOODWAY DATA

MCPHERREN DITCH

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## 5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the Town of Roanoke.

### 5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

| Average Difference Between 10- and 100-Year Floods | Variation |
|---|---|
| Less than 2 feet | 0.5 foot |
| 2 to 7 feet | 1.0 foot |

Three reaches meeting the above criteria were required for the flooding sources of the Town of Roanoke, two on McPherren Ditch and one on Cow Creek. The locations of the reaches are shown on the Flood Profiles.

### 5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

### 5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Town of Roanoke was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

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Zone A1, A3, A4: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones assigned according to FHFs.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or, areas subject to 100-year flooding from sources with drainage areas of less than one square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

### 5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Roanoke is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

## 6.0 OTHER STUDIES

A Flood Insurance Study has been prepared for the unincorporated areas of Huntington County. The results of the two studies will match exactly. A Flood Hazard Boundary Map has been published by the Federal Insurance Administration (Reference 14). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study. No other studies were found to exist at the time of this report.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

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| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND | | | FHF | ZONE | BASE FLOOD ELEVATION[3] |
|---|---|---|---|---|---|---|---|
| | | 10% (10 YR.) | 2% (50 YR.) | 0.2% (500 YR.) | | | |
| Cow Creek | | | | | | | |
| Backwater Reach | 0005 | -1.5 | -0.4 | 0.6 | 015 | A3 | 753.0 |
| Reach 1 | 0005 | -2.0 | -0.3 | 0.6 | 020 | A4 | Varies |
| McPherren Ditch | | | | | | | |
| Backwater Reach | 0005 | -1.5 | -0.4 | 0.6 | 015 | A3 | 753.0 |
| Reach 1 | 0005 | -1.4 | -0.5 | 0.7 | 015 | A3 | Varies |
| Reach 2 | 0005 | -0.6 | -0.2 | 0.4 | 005 | A1 | Varies |

[1] Flood Insurance Rate Map panels.
[2] Weighted average.
[3] Rounded to nearest whole foot - see map.

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF ROANOKE, IN
(HUNTINGTON CO.)

FLOOD INSURANCE ZONE DATA

COW CREEK - MCPHERREN DITCH

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## 7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 S. Wacker Drive, 24th Floor, Chicago, Illinois 60606.

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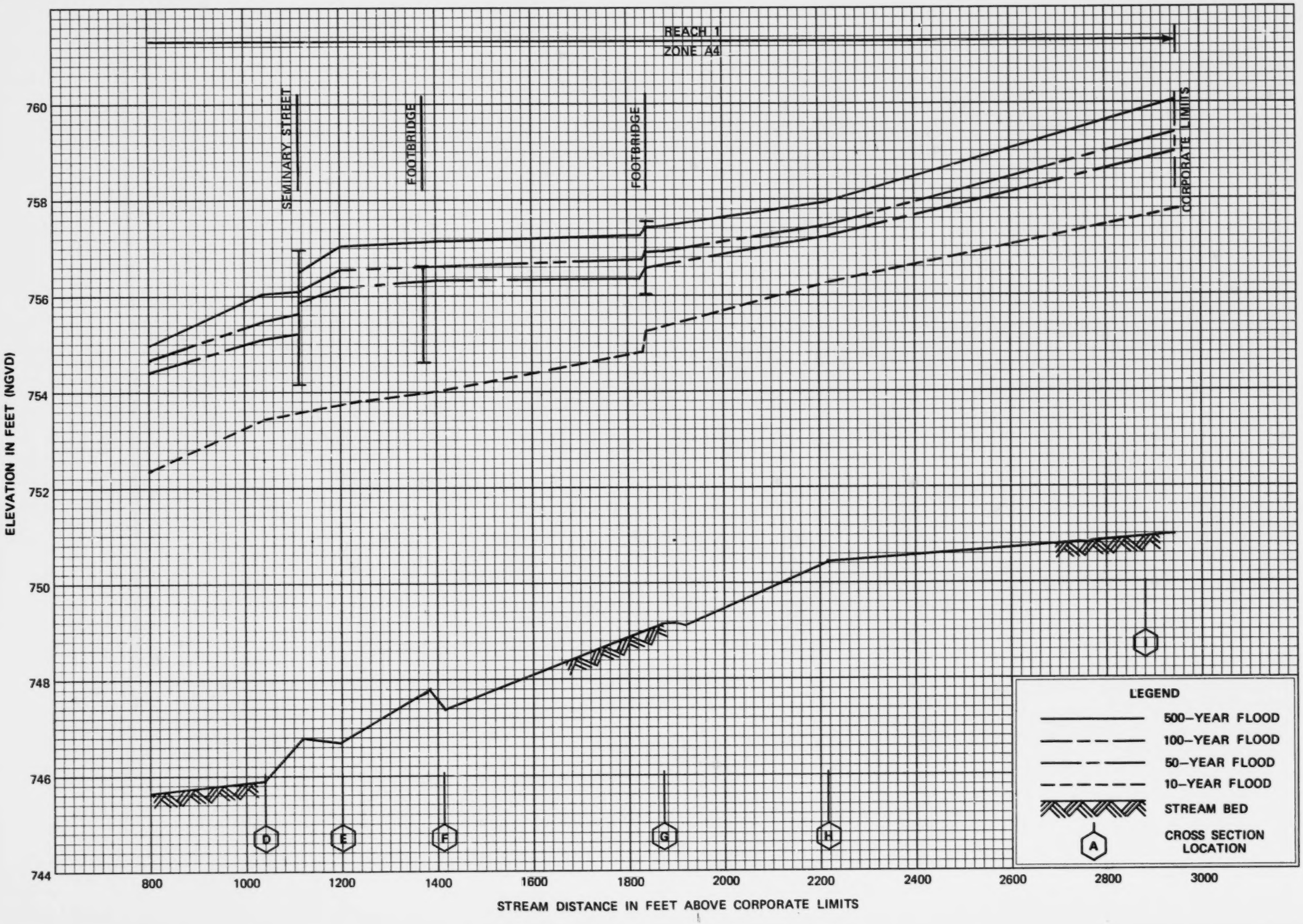


FLOOD PROFILES

COW CREEK

TOWN OF ROANOKE, IN
HUNTINGTON CO.

02P

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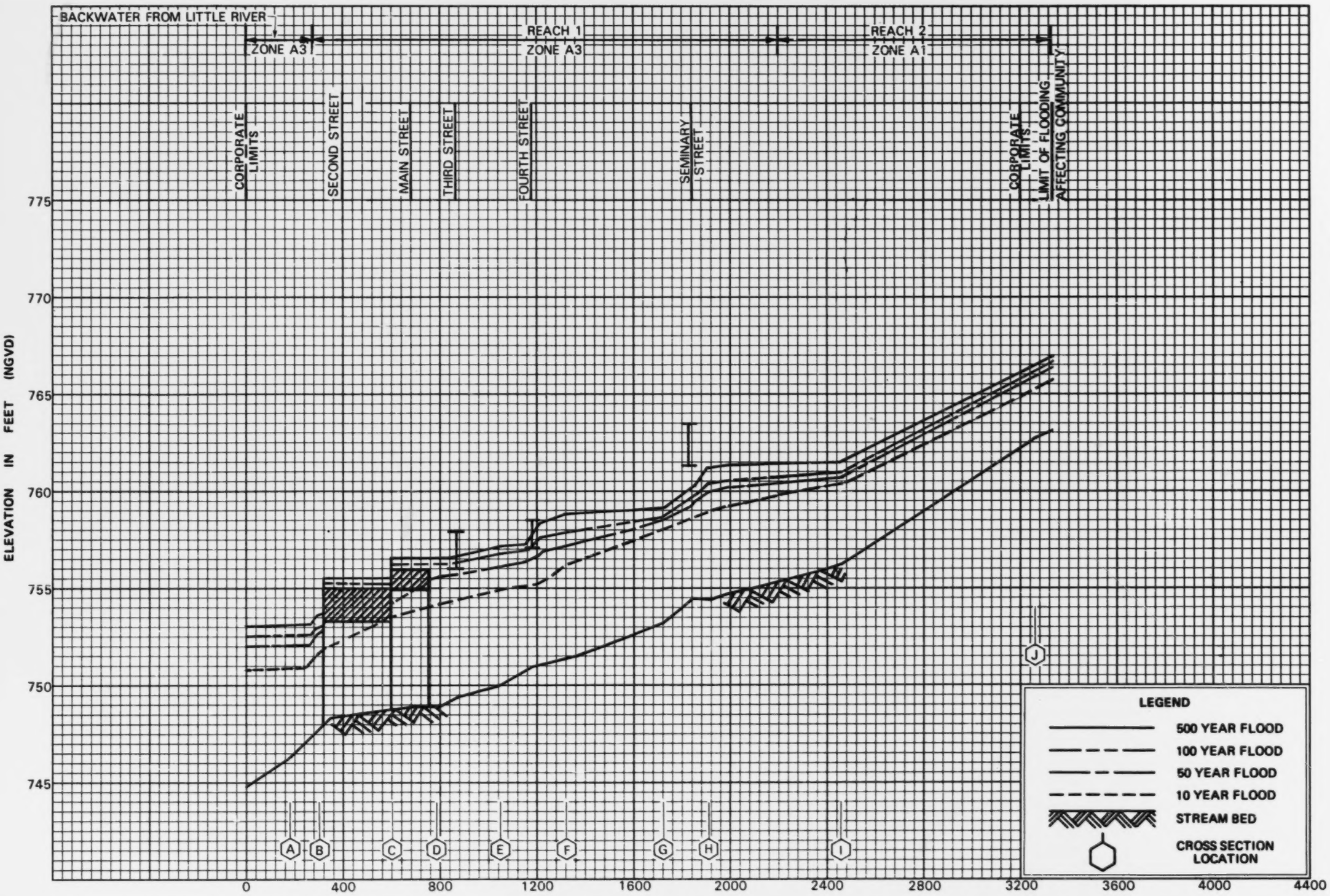


FLOOD PROFILES

McPHERREN DITCH

federal emergency management agency

TOWN OF ROANOKE, IN
HUNTINGTON CO.

03P